FINGERPRINTING DIESEL AND PETROL FUELS FOR ADULTERATION

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Abstract

Expensive consumer products are often adulterated by integrating with cheaper low quality materials having similar physical and chemical properties. Adulteration of petrol and diesel using petrochemical based products often has reported in developing countries which lead to the degradation of engine performances and fugitive emissions. Having similar chemical properties, the fuel and the adulterant cannot be distinguished easily leading to complications in identification and quantification of the adulterants.

In this investigation, a synchronize fluorimetric analysis method was developed targeting to obtain the fingerprints for these fuels based on their polycyclic aromatic hydrocarbons (PAH) content. In a synchronize fluorescence scan both the excitation and emission wavelengths are scanned keeping the wavelength difference at a fixed value. PAHs are group of compounds with fused benzene ring systems which are naturally present and/or formed during the fuel processing which exhibit significant differences in their synchronize fluorescence scans. Simulated adulterated samples of petrol or diesel with kerosene, diluted in hexane were prepared from the fuels collected from the petroleum refinery. These simulated fuel samples showed linear variations of the synchronize emission intensity with the level of kerosene in the fuel at specific wavelengths. This relation was utilized to investigate level of adulteration for petrol and diesel available from different petrol stations. Based on our investigation from ten petrol stations in Colombo and its suburbs, diesel adulteration was found to be in the range of 0 to 35% while the petrol adulteration was found to be in the range of 0 to 48%.